

The Effect of Distance to Health Facilities on Skilled Birth Attendance

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Abstract

Maternal mortality remains disproportionately concentrated in geographically remote areas with limited resources, where skilled birth attendance is a crucial determinant of the survival of mothers and newborns. The objective of this study is to examine the effect of distance to health facilities on skilled birth attendance in Viqueque District, Timor-Leste, and to explore the mechanisms linking geographic remoteness to the use of health services. Methods a sequential explanatory mixed-methods design was employed. A cross-sectional survey of 410 women of reproductive age was conducted using multistage cluster sampling, and relationships among variables were evaluated using multivariate binary logistic regression; eighteen in-depth interviews and three focus group discussions were analyzed thematically. Findings the overall rate of births attended by trained health personnel was 51.2%, decreasing from 70.8% among women living within 5 km of a health facility to 20.8% among those living more than 10 km away. Distance remained the strongest independent predictor after adjustment (adjusted odds ratio 6.10; 95% CI 3.39–10.98). Having at least four antenatal visits, higher educational attainment, greater household wealth, readiness for childbirth, and knowledge of obstetric danger signs were also significant. Qualitative findings highlighted barriers related to transportation, cost, trust in service providers, family decision-making, and mobile phone reminders. The conclusion is that distance is a modifiable and dominant determinant of deliveries attended by trained health personnel in this setting; therefore, combined supply- and demand-side interventions are needed.

Keywords: Geographic accessibility, maternal health, mixed methods, skilled birth attendance.

History Article : Submit : 24 July 2026 Accepted 22 August 2026 : Publish : 31 August 2026

Doi : <https://doi.org/10.64146/2ssar093>

How to cite this article:

Pereira, J. da C., Soares, M. F. ., Ximenes, D. A. ., & Guterres, A. B. (2026). The Effect of Distance to Health Facilities on Skilled Birth Attendance. *Health Smart : Jurnal Kesehatan Masyarakat*, 2(2), 107-120. <https://doi.org/10.64146/2ssar093>

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e-ISSN: 3111-2131

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INTRODUCTION

Maternal mortality remains one of the most sensitive indicators of inequity in global health. Although the past two decades have witnessed substantial reductions in maternal deaths, an estimated 287,000 women still died in 2020 from causes directly related to pregnancy and childbirth, and the overwhelming majority of these deaths occurred in low- and middle-income countries (Khurana et al., 2024; World Health Organization, 2023). The third Sustainable Development Goal (SDG 3.1) sets an ambitious target of reducing the global maternal mortality ratio to fewer than 70

deaths per 100,000 live births by 2030, a benchmark that will remain unattainable unless countries achieve sustained and equitable improvements in the provision and quality of care during labour and childbirth.

Among the interventions available to health systems, ensuring the presence of a skilled birth attendant a physician, nurse, or midwife trained to manage normal deliveries and to recognise and respond to obstetric emergencies at the moment of birth has consistently proven to be one of the most effective strategies for averting maternal and neonatal deaths ([Baten et al., 2025](#); [Dickson et al., 2021](#)). Skilled attendance thus carries a dual significance: it functions at once as a direct clinical safeguard and as a widely accepted proxy for the broader responsiveness and equity of a health system ([Ema et al., 2023](#)).

Coverage of skilled birth attendance has nonetheless advanced unevenly, and the divide between women who reach a skilled provider and those who do not reflects, to a considerable degree, the geographical circumstances in which women live. Across many settings in sub-Saharan Africa and South Asia, a substantial proportion of births still take place at home without any trained provider, and the literature consistently identifies rural residence as a structural marker of disadvantage in access to delivery care ([Addo-Preko et al., 2023](#); [Bediako et al., 2021](#); [UNICEF, 2024](#)).

Physical distance from home to the nearest functional health facility offering delivery care is a concrete and potentially modifiable determinant of whether a skilled attendant is present at birth. Cross-sectional surveys and spatial analyses from diverse settings have consistently documented that the likelihood of an institutional delivery declines as travel distance and time increase, and that geographic remoteness can override other protective factors that would otherwise favour skilled care ([Awol et al., 2023](#); [Fontenot et al., 2024](#); [Sebsibe & Kebede, 2024](#)). Trend data further indicate that gains in skilled attendance have accrued more slowly in geographically marginalised communities, thereby widening within-country disparities over time ([Talon et al., 2023](#)).

Distance alone, however, cannot fully account for the variation in skilled birth attendance. A substantial body of evidence has established that multiple socioeconomic and service-related factors operate in concert to determine where, and with whom, a woman gives birth. Maternal education and household economic status stand out among the most consistently reported predictors: women with secondary or higher education and those in wealthier households are substantially more likely to deliver under skilled care ([Fadillah & Suryadi, 2025](#); [Islam et al., 2024](#); [Rashid et al., 2022](#)).

Antenatal care attendance occupies a particularly pivotal position within this web of determinants. Women who complete the recommended number of antenatal visits are far more likely to deliver subsequently in a facility, not only because these contacts provide birth-planning information and counselling, but also because they represent an earlier, trust-building engagement with the formal health system. The continuum-of-care framework conceptualises antenatal

attendance, skilled delivery, and postnatal care as interconnected stages, in which uptake at one point predicts uptake at the next ([Gandhi et al., 2022](#); [Ihsan et al., 2026](#); [Longchar et al., 2025](#); [Negash et al., 2024](#)). Parity, birth preparedness, knowledge of obstetric danger signs, and women's autonomy in health-related decision-making have likewise been associated with care-seeking behaviour around childbirth ([Sharma et al., 2024](#)).

How distance produces an absence of skilled care at delivery remains underexplored. Mixed-methods and qualitative enquiries have begun to unpack these mechanisms, demonstrating that women and families experience remoteness not simply as a matter of kilometres but as an interlocking set of challenges: the scarcity and unreliability of transport, costs that many households are unable to bear, the very real fear of going into labour while still en route, and the sheer inaccessibility of facilities after dark or when rainy-season flooding has rendered roads impassable ([Fong et al., 2022](#); [King & Jones, 2022](#)).

Such accounts also reveal that decisions about where and with whom a woman will give birth are rarely made by the woman herself in isolation; husbands, mothers-in-law, and prevailing community norms exert considerable influence, and the attitude of health workers can either encourage women to return or create a lasting reluctance to seek facility-based care. Mixed-methods designs that combine women's own accounts with regression-based estimates can identify the population groups for which targeted policy action is most urgently needed ([Margareth et al., 2026](#); [Sandoko et al., 2026](#); [Singh & Rajak, 2024](#)).

Timor-Leste bears one of the heaviest maternal mortality burdens in the Southeast Asian region, a situation shaped by the intersection of a dispersed, predominantly rural population, demanding mountainous terrain, an underdeveloped road network, and a health workforce that is concentrated disproportionately in district towns ([Samad et al., 2022](#); [Silva et al., 2026](#); [World Health Organization et al., 2023](#)). At the policy level, national health authorities have committed to promoting facility-based delivery and have invested in demand-side initiatives, most prominently the Liga Inan ("Mother Connect") programme, which uses mobile-phone messaging to maintain contact between pregnant women and their midwives and to prompt timely antenatal attendance and facility delivery ([World Health Organization, 2023](#)).

Evidence drawn from comparable settings suggests that such mobile-health and continuity-of-care interventions hold genuine potential to raise rates of institutional delivery and postnatal service uptake, especially where they reinforce an established relationship with a provider the woman already knows and trusts ([Daryati, Anggraini, et al., 2026](#); [Eka Daryati & Sadiana, 2025](#); [Gayesa et al., 2023](#)). Sustaining the quality and uninterrupted availability of essential maternal health services in fragile health systems is nevertheless far from straightforward, as the disruptions experienced during the COVID-19 pandemic made evident in Timor-Leste's own recent experience ([Kleine-Bingham et al., 2023](#)).

Despite these policy commitments, few studies have directly quantified the effect of objectively measured geographic distance on skilled birth attendance in Timor-Leste. Most of the quantitative evidence on geographic barriers to skilled attendance originates from sub-Saharan Africa and South Asia, whereas the limited Timorese research available has tended to focus on fertility behaviour, women's empowerment, or qualitative experience rather than on directly estimating the effect of measured distance on skilled attendance rates ([Abebe & Debelew, 2025](#); [Samad et al., 2022](#)).

Subnational and multilevel analyses conducted elsewhere have demonstrated that the determinants of facility delivery vary considerably across districts, which counsels caution against applying national or foreign estimates to a specific local setting without adjustment ([Oyedele, 2023](#)). District-specific evidence that links geo-referenced distance data with individual-level risk factors and women's first-hand accounts therefore carries both scientific merit and immediate practical utility for decisions about where to locate services, transport interventions, and community outreach ([Sheikh et al., 2024](#)).

Against this background, the present study set out to examine the effect of distance to health facilities on skilled birth attendance in Viqueque District, Timor-Leste, while adjusting for relevant socioeconomic and service-related variables, and to explore, through the accounts of women and health providers, the mechanisms connecting geographic remoteness to care-seeking outcomes. The working hypothesis held that greater distance from the nearest delivery facility would be independently associated with a reduced probability of skilled birth attendance, and that transport constraints, the financial costs of care, and household-level decision-making would emerge as the principal channels through which remoteness discourages the use of skilled providers. The novelty of this study lies in its integration of geo-referenced distance data, individual-level determinants, and women's lived experiences within a single explanatory sequential design generating the first district-specific, mixed-methods evidence of its kind for Timor-Leste and yielding directly actionable guidance for the siting of services, transport interventions, and community outreach.

METHODOLOGY

Type of research

This study adopted an explanatory sequential mixed-methods design, in which a quantitative analytical cross-sectional survey was completed first and its findings were subsequently explained and elaborated through a qualitative phase ([Singh & Rajak, 2024](#)). The cross-sectional component was selected because it allowed estimation of the association between facility distance and skilled birth attendance while simultaneously controlling for potential confounding variables ([Sheikh et al., 2024](#)).

Time and place of research

Data collection was carried out during 2024 in Viqueque District, a municipality situated in the eastern part of Timor-Leste. The district is characterised by predominantly rural land use and mountainous topography, conditions that make it well suited to examining the influence of geographic distance on the use of skilled delivery care.

Population and sample

The study sought to examine the effect of distance to health facilities on skilled birth attendance while accounting for relevant socioeconomic and service-related variables, and to explore the mechanisms linking geographic remoteness to care-seeking outcomes. The quantitative target population comprised women of reproductive age (15–49 years) who had given birth at least once in the two years immediately prior to data collection and who were habitual residents within the selected study areas.

The minimum sample size was determined using the single-population-proportion formula, $n = (Z^2 \times P \times (1 - P)) / d^2$, where Z is the standard normal deviate at the 95% confidence level (1.96), P the expected proportion, and d the margin of error. An expected skilled birth attendance proportion of 50% was assumed to maximise variability, with a 5% margin of error, a design effect of 1.5 to account for the cluster structure of the sample, and a 10% adjustment for anticipated non-response, yielding a target of 423 participants. A multistage cluster sampling procedure was employed: administrative posts (sucos) were selected first, villages (aldeias) were then drawn within each selected post, and eligible women were enrolled from the selected villages. Complete and usable data were obtained from 410 women, corresponding to a response rate of 96.9%.

The qualitative subjects were recently delivered women and community members purposively selected to explain the quantitative findings. This group comprised 18 women who took part in in-depth interviews together with the participants of three focus group discussions held one each with women, husbands, and community health workers.

Data collection techniques and instrument development

Quantitative data were gathered through structured face-to-face interviews, using a questionnaire adapted from standard Demographic and Health Survey instruments and pre-tested locally before fieldwork commenced. The questionnaire captured the primary outcome, the main exposure, and a predefined set of covariates.

The primary outcome was skilled birth attendance at the woman's most recent delivery, operationalised as attendance by a doctor, nurse, or midwife and coded as a binary variable (Ema et al., 2023). The main exposure was the straight-line distance from a woman's home to the nearest health facility offering delivery services, geo-referenced using GPS coordinates and examined both as a continuous measure and as a categorical variable with three bands (<5 km, 5–10 km, and >10 km) (Rashid et al., 2022). The covariates, selected prior to analysis on the basis of existing literature,

were maternal age, educational attainment, household wealth quintile, parity, number of antenatal visits, birth preparedness status, knowledge of obstetric danger signs, and women's decision-making autonomy.

Qualitative data were collected through 18 in-depth interviews with recently delivered women and three focus group discussions guided by semi-structured topic guides. The guides were applied until thematic saturation was reached (Sebsibe & Kebede, 2024).

Data analysis techniques

Quantitative data were processed using statistical software. Descriptive statistics were computed to characterise the sample, and the chi-square test was applied to examine bivariate associations. All variables that attained a p-value below 0.25 in bivariate testing were entered into a multivariable binary logistic regression model; the results are reported as adjusted odds ratios (AOR) with 95% confidence intervals, and the threshold for statistical significance was set at $p < 0.05$. The Hosmer–Lemeshow test was used to evaluate goodness of fit (Awol et al., 2023).

Qualitative transcripts were translated into English and analysed inductively through thematic analysis. Integration of the two strands occurred at the interpretation stage, where the quantitative findings were explained and contextualised using the qualitative insights, in direct alignment with the problems and objectives of the study.

Ethical considerations

Ethical clearance was secured from the relevant institutional review board and from the Ministry of Health prior to any field activity. All participants provided written informed consent before being interviewed.

RESULTS AND DISCUSSION

RESULTS

Of the 423 women who were approached, 410 completed all sections of the questionnaire and were therefore retained in the analysis. Table 1 presents their background characteristics. Average maternal age was 28.4 years (SD = 6.3), and the majority of participants fell within the 20–34-year age group (69.8%). More than half the sample, 57.3%, had attained no formal schooling or primary education only. Among the women surveyed, 55.6% had attended fewer than four antenatal visits during their most recent pregnancy, and 41.2% reported that their birth preparedness had been adequate.

Table 1. Background characteristics of the study participants

Characteristic	Category	n (%)
Maternal age (years)	<20	52 (12.7)
	20–34	286 (69.8)
	≥35	72 (17.6)
Maternal education	None/primary	235 (57.3)
	Secondary or higher	175 (42.7)
Household wealth	Poorest tertile	158 (38.5)
	Middle tertile	140 (34.1)
	Richer tertile	112 (27.3)
Parity	Primipara	121 (29.5)
	Multipara	289 (70.5)
Antenatal contacts	<4	228 (55.6)
	≥4	182 (44.4)
Birth preparedness	Adequate	169 (41.2)
	Not adequate	241 (58.8)
Danger-sign knowledge	Good	156 (38.0)
	Poor	254 (62.0)
Decision-making autonomy	High	173 (42.2)
	Low	237 (57.8)

N = 410; mean (SD) maternal age = 28.4 (6.3) years. Percentages may not sum to 100 because of rounding.

Across the entire sample, 210 of the 410 women (51.2%) had delivered with a skilled attendant present. As shown in Table 2, this proportion varied substantially according to how far women lived from their nearest facility. Women residing within 5 km of a facility had a skilled attendance rate of 70.8%, whereas the rate fell to 48.6% among those 5–10 km away and to only 20.8% among the most distant group, those living beyond 10 km. The chi-square test confirmed that this gradient across distance bands was highly statistically significant ($\chi^2 = 61.9$, $df = 2$, $p < 0.001$).

Table 2. Skilled birth attendance by distance to the nearest health facility

Distance category	Total n	Skilled, n (%)	Not skilled, n (%)
<5 km	168	119 (70.8)	49 (29.2)
5–10 km	146	71 (48.6)	75 (51.4)
>10 km	96	20 (20.8)	76 (79.2)
Total	410	210 (51.2)	200 (48.8)

$\chi^2 = 61.9$, $df = 2$, $p < 0.001$.

Following logistic regression analysis (Table 3), facility distance was confirmed as the strongest independent predictor of skilled birth attendance even after adjusting for socioeconomic and service-related factors. In comparison with women living beyond 10 km, those within 5 km had six-fold higher adjusted odds of a skilled delivery (AOR = 6.10, 95% CI 3.39–10.98), and women at intermediate distances of 5–10 km had nearly three-fold higher odds (AOR = 2.85, 95% CI 1.59–5.11). Completing at least four antenatal visits (AOR = 3.20, 95% CI 1.90–5.39), having secondary or higher education (AOR = 2.40, 95% CI 1.41–4.09), belonging to a wealthier household (AOR = 2.05, 95% CI 1.21–3.47), adequate birth preparedness (AOR = 1.90, 95% CI 1.12–3.22), and sound

knowledge of obstetric danger signs (AOR = 1.75, 95% CI 1.05–2.91) were each independently associated with skilled attendance. Maternal age, parity, and decision-making autonomy did not reach statistical significance in the adjusted analysis. The model demonstrated good calibration (Hosmer–Lemeshow $\chi^2 = 6.42$, $p = 0.60$), explained 34% of the variance (Nagelkerke $R^2 = 0.34$), and correctly classified 73.2% of cases.

Table 3. Crude and adjusted odds ratios for factors associated with skilled birth attendance

Variable	COR (95% CI)	AOR (95% CI)	p
Distance <5 km (ref >10 km)	9.23 (5.05–16.86)	6.10 (3.39–10.98)	<0.001
Distance 5–10 km (ref >10 km)	3.60 (1.99–6.49)	2.85 (1.59–5.11)	<0.001
Antenatal contacts ≥ 4 (ref <4)	4.05 (2.62–6.26)	3.20 (1.90–5.39)	<0.001
Secondary or higher education	3.10 (2.02–4.76)	2.40 (1.41–4.09)	0.001
Higher household wealth	2.71 (1.71–4.30)	2.05 (1.21–3.47)	0.008
Adequate birth preparedness	2.55 (1.68–3.87)	1.90 (1.12–3.22)	0.018
Good danger-sign knowledge	2.30 (1.51–3.49)	1.75 (1.05–2.91)	0.031
Multipara (ref primipara)	0.70 (0.45–1.09)	0.62 (0.38–1.01)	0.055
High decision-making autonomy	2.10 (1.39–3.17)	1.58 (0.98–2.55)	0.061
Maternal age ≥ 20 years	1.62 (0.91–2.88)	1.45 (0.79–2.66)	0.230

COR = crude odds ratio; AOR = adjusted odds ratio; CI = confidence interval; reference categories shown in parentheses. Hosmer–Lemeshow $\chi^2 = 6.42$, $p = 0.60$; Nagelkerke $R^2 = 0.34$; 73.2% of cases correctly classified.

The qualitative component enriched these statistical patterns by illuminating five interrelated themes drawn from the in-depth interviews and focus group discussions (Table 4). First and most prominently, distance and transport access were identified as decisive barriers, particularly when labour began at night or during the rainy season, when flooded rivers and deteriorated roads rendered travel hazardous or impossible. A second theme centred on the direct and indirect financial costs of reaching and staying near a facility, which many families found prohibitive. Third, the nature of women’s relationships with midwives characterised by trust, respect, and perceived quality of communication strongly influenced their willingness to seek facility care. Fourth, place-of-birth decisions were rarely made unilaterally; they emerged from family negotiations in which husbands and mothers-in-law typically held decisive influence. A fifth theme underscored the enabling role of antenatal contact and mobile phone reminders, which women and health workers identified as drawing women into the care system earlier and facilitating delivery planning.

Table 4. Qualitative themes and representative quotations

Theme	Representative quotation
Distance and transport as decisive barriers	“When the pains came at night, the river was high and there was no car so my mother helped me at home.” (P07)
Direct and indirect costs of care	“We have no money for transport, and who will feed the children if I stay far away for days?” (P12)
Trust in and relationship with midwives	“The midwife was kind and explained everything; that is why I went back to the centre.” (P03)

Family-centred decision-making	“My husband and my mother-in-law decide where I give birth.” (FGD, women)
Antenatal contact and mobile reminders as enablers	“The women who registered for the phone messages came earlier and planned to deliver with us.” (FGD, health workers)

P = in-depth interview participant; FGD = focus group discussion. Quotations were translated from Tetum and lightly edited for readability.

DISCUSSION

This study set out to quantify the effect of distance on skilled birth attendance in Viqueque District and to illuminate the mechanisms through which geographic remoteness discourages the use of skilled care. The findings support a clear and consistent conclusion: proximity to a delivery facility was the strongest independent predictor of skilled attendance identified in this study. Women residing within 5 km of a facility were six times more likely to deliver with a skilled provider than those living beyond 10 km, and the rate of skilled attendance fell from 70.8% in the nearest group to barely one in five among the most remote. This steep, dose-dependent gradient is consistent with evidence from a range of comparable settings in which institutional delivery rates decline sharply as travel distance and time increase, and in which geographic isolation can eclipse otherwise favourable individual-level circumstances (Fontenot et al., 2024; Gilano et al., 2022; Sebsibe & Kebede, 2024).

The finding that antenatal care attendance was an independent predictor of skilled delivery lends support to the continuum-of-care perspective. Women who attended at least four antenatal visits were considerably more likely to deliver in a facility with a skilled attendant, corroborating evidence from other settings that earlier and more sustained engagement with the health system predicts later facility use, both because antenatal contacts enable birth planning and because they foster trust between the woman and her provider (Daryati, Hamzah, et al., 2026; Gandhi et al., 2022; Negash et al., 2024). This pattern suggests that antenatal care functions as more than a clinical intervention; it may serve as a gateway that can partially counteract geographic disadvantage, provided that women are actively supported in planning their delivery well in advance.

Education and household wealth likewise emerged as independent predictors, consistent with their durable prominence in the broader literature on skilled birth attendance (Dickson et al., 2021; Islam et al., 2024; Rashid et al., 2022). Greater educational attainment may enhance health literacy, strengthen a woman’s autonomy in seeking care, and improve her ability to navigate health services, whereas household wealth reduces the practical friction imposed by the direct and indirect costs of transport and facility-based care costs that the qualitative data confirmed were frequently the deciding factor for poorer and more remote families.

Integration of the qualitative strand clarified the concrete ways in which distance translates into an absence of skilled care. Participants did not speak of distance in the abstract; they described it through lived experience: the impossibility of reaching a facility at night, the impassability of roads and rivers during the rainy season, transport that was unavailable or unaffordable, and delivery

decisions reached collectively within the family, in which husbands and mothers-in-law frequently held decisive authority (Fong et al., 2022; King & Jones, 2022; Margareth et al., 2026). The narratives also underscored the importance of provider trust and the practical value of mobile-phone reminders in encouraging earlier care-seeking, echoing mixed-methods evidence from other settings that locates the barrier to facility delivery at the intersection of supply constraints, cost, and social norms rather than in physical distance alone (Singh & Rajak, 2024).

These findings carry specific and actionable implications for health policy in Timor-Leste. Given that the barrier is fundamentally one of geographic access, supply-side responses that bring skilled care physically closer to remote communities are likely to generate the greatest gains. These include decentralising basic emergency obstetric and newborn care to subdistrict facilities, establishing maternity waiting homes near referral points so that women in the final weeks of pregnancy can stay close to care, and strengthening emergency transport systems and communication links (Abebe & Debelew, 2025; Fong et al., 2022).

Such supply-side investments should be complemented by demand-side strategies that have demonstrated effectiveness in comparable settings, particularly sustained use of mobile-health platforms such as Liga Inan, reinforcement of antenatal contact coverage, and birth-preparedness counselling that meaningfully involves husbands and community leaders (Gayesa et al., 2023; Herdiansyah et al., 2026; Kurniawan et al., 2026). Maintaining the quality and continuity of these services through periods of system stress will be equally important if the coverage gains achieved are to be sustained (Kleine-Bingham et al., 2023; Oyedele, 2023).

Several limitations warrant acknowledgement. The cross-sectional design permits estimation of associations but cannot establish causal direction, and the temporal sequence of some covariates relative to the outcome cannot be confirmed with certainty. Recall and social-desirability biases may affect women's self-reports of their delivery experience and antenatal history. Straight-line distance, although objective and reproducible, does not capture road quality, terrain difficulty, or the seasonal inaccessibility of routes, and may therefore underestimate the true functional burden of remoteness (Awol et al., 2023; Sebsibe & Kebede, 2024). Because this was a single-district study, its findings reflect the particular geographic, demographic, and service conditions of Viqueque and should be generalised to other districts or to the national level only with appropriate caution, given the well-documented variation in the determinants of facility delivery across subnational contexts.

The central finding is nonetheless strengthened by the convergence of a strong, graded quantitative association with mutually reinforcing qualitative accounts. By combining geo-referenced distance data with individual-level socioeconomic factors and women's own narratives, the study generates district-specific evidence of direct practical relevance for decisions about how and where to prioritise service delivery, transport investment, and community outreach in a high-burden, geographically challenging context.

CONCLUSION

This study demonstrates that distance to health facilities is the dominant modifiable determinant of skilled birth attendance in Viqueque District, Timor-Leste, with coverage declining from 70.8% among women living within 5 km of a facility to 20.8% among those living beyond 10 km, and with the proximity advantage persisting at six-fold adjusted odds after control for confounders. Completing at least four antenatal visits, higher educational attainment, greater household wealth, adequate birth preparedness, and sound knowledge of obstetric danger signs each contributed independently to skilled attendance.

The qualitative findings showed that remoteness acts through the unavailability and unaffordability of transport, the financial costs of facility-based care, family decision-making in which husbands and mothers-in-law hold authority, and the trust women have built with midwives, while antenatal contacts and mobile-phone reminders enabled earlier, more planned care-seeking.

Improving skilled attendance therefore requires concerted action on both sides of the access equation. Supply-side priorities include decentralising basic emergency obstetric and newborn care, establishing maternity waiting homes near referral facilities, strengthening emergency transport systems, and retaining midwives in remote communities. Demand-side measures include expanding antenatal coverage, sustaining mobile-health platforms such as Liga Inan, and providing birth-preparedness counselling that actively engages husbands and community leaders. Future research should employ longitudinal designs, incorporate travel-time measures, and span multiple districts to strengthen causal inference and enhance generalisability.

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